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GMPLS Module

DML Configuration Description

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1. LSR Configuration

Keyword	Description
LSR [graph [ProtocolSession [name S_SCRLDP use gov.nist.antd.mpls.signalizing.crldp.S_CRLDP debug %S ProcessingDelay %F] ProtocolSession [name rsvp use gov.nist.antd.rsvp.mgmt.Rsvp rsvp_init [R %I(sec) K %I SlewMax %F HelloExtension [Interval %F(sec) LossHellMsgInterval %F(sec)] ProcessingDelay %F(sec)]]	We must define the signaling protocol. The supported signaling protocols are CR-LDP and RSVP-TE. R : Refresh Time, default value 30sec K : L >= (K+0.5)*1.5+R, default value 3 SlewMax : Default value 0.3, Successive value of R ₂ /R ₁ < 1 + SlewMax If this description is not defined Hello extension function is not used within a simulation. Otherwise Hello extension will be used through simulation. Interval : The time between two successive hello packets, default value 5ms. LossHellMsgInterval : Loss of Hello Message interval, default value is 3.5 RSVP-TE is considered under the circumstances that the logical network configuration exists. This parameter will compensate for the processing delay each node.
ProtocolSession[name MPLSModule use gov.nist.antd.mpls.mgmt.MPLSMgmt mplsinit [debug %S (true/false) SigIntf_debug %S (true/false) IntfMgmt_debug %S (true/false) fwd_debug %S (true/false) fwdTable_debug %S (true/false) PacketScheduler [PrimaryScheduler [name %S use %S] SecondaryScheduler [name %S use %S Priority %I]]	MPLS Management module debug flag MPLS Mgmt module creates four modules; the Interface management, signaling interfaces management, forwarding table management, and forwarding module. Each module's debug flag can be specified through these parameters MPLS module supports three different schedulers; Round-Robin, Priority, and WFQ Scheduler. It is possible to configure single scheduler or hybrid scheduler. In order to configure hybrid scheduler scheme, it must be specified both "PrimaryScheduler" and "SecondaryScheduler" at the same time. To use single scheduler, it must be defined "PrimaryScheduler". Any combination of three schedulers is possible except the use of WFQ as PrimaryScheduler in hybrid scheduler Scheme. -RoundRobin name RoundRobin use gov.nist.antd.mpls.mgmt.mpls_interface.RoundRobinScheduler -Priority name Priority use gov.nist.antd.mpls.mgmt.mpls_interface.PriorityScheduler. -WFQ

	<p>name WFQ use gov.nist.antd.mpls.mgmt.mpls_interface.WFQScheduler</p> <p>Through Queue section, three kinds of queue are supported; DropTail, RED, Priority Queue.(DropTail, RED, Priority)</p> <p>There are two ways to specify the buffer size. One is explicitly to specify a buffer size with “BufferSize” and the other way is implicitly to define the size of buffer with “TargetUtilization”, “TargetPacketLossRate”, and “AveragePacketSize”.</p> <p>BufferSize = AveragePacketSize * $(\ln(\text{TargetPacketLossRatio}) / \ln(\text{TargetUtilization}) - 1)$</p> <p>THmin : Minimum threshold of the buffer(0.0~1.0) THmax : Maximum threshold of the buffer(0.0~1.0) Pmax : Maximum drop probability(0.0~1.0) QueueWeight : Queue Weight Mean Packet Size : Average packet size(int)</p>
<pre> Queue [Type %S BufferSize %I(bytes) TargetUtilization %F(%) TargetPacketLossRatio %F(%) AveragePacketSize %F(bytes) RED[THmin %F(0.0~1.0, Default : 0.4) THmax %F(0.0~1.0, Default : 0.8) Pmax %F(0.0~1.0, Default : 0.02) QueueWeight %F(Default : 0.002) MeanPktSize %F(Defulat : 1000)] Monitor [name QueueMonitor use] gov.nist.antd.mpls.mgmt.mpls_interface.QueueMonitor probe_interval %F(default : 1.0) debug %S(true/false)]] lspMonitor [use gov.nist.antd.mpls.mgmt.lspMonitor probe_interval %F(sec) debug %S(true/false)]] nicMonitor [use gov.nist.antd.mpls.mgmt.NicMonitor probe_interval %F(sec) debug %S(true/false)] </pre>	<p>Define the LSP monitor. Each LSP can be monitored if this section is defined. Through this monitor, the following statistical data are gathered.</p> <p>Bandwidth Information</p> <ul style="list-style-type: none"> - Total Used bandwidth / Throughput (BPS) - Packet Drop Ratio (cause of Traffic policy of each LSP) - Utilization <p>Time Information</p> <ul style="list-style-type: none"> - End-to-End Delay - Average End-to-End delay - Jitter, min/max delay within probe interval - <p>Through this monitor, the following statistical data of NICs attached to LSR is collected.</p> <p>Incoming packet count/bytes/bits Outgoing packet count/bytes/bits</p>
OAMInit [OAM module supports four OAM functions, such as Performance monitoring, lookback test, continuity check and performance degradation report from the egress LSR. Each OAM function is activated by enabling the following flags.
RevertiveMode %S (on/off)	Revertive Mode on/off
PerformanceMontioring [active %S monitor [debug %S use] gov.nist.antd.mpls.mgmt.OAM.oamPMMonitor]]	Performance monitoring
ContinuityCheck %S (on/off)	Continuity Check on/off

PerformanceDegradationReport [EndtoEndDelayLimit %I (sec) JitterLimit %I (sec) PacketLossRatioLimit %I (%)]]	It this section is defined Performance degradation report function is enabled. If it's ON, the egress LSR will send notification messages into ingress LSR when the egress LSR detects the degradation of traffic performance by comparing current traffic status with pre-defined constraints such as end-to-end delay, jitter limit, and packet loss ration limit.
ProtocolSession[name te-app use gov.nist.antd.ospf_te.TEPath]	
ProtocolSession [name ospf-te use gov.nist.antd.ospf_te.sOSPF_TE]	
ProtocolSession [name ip use gov.nist.antd.ssf.os.IP]	
ProtocolSession [name icmp use SSF.OS.ICMP]	
ProtocolSession [name ospf use SSF.OS.OSPF.sOSPF]	
ProtocolSession [name probe use SSF.OS.ProbeSession file "resultFile" stream result]	This section defines the ProbeSession that is used to generate the simulation result through the defined stream and file. All monitors, queue monitor, LSP monitor and NIC monitor write their own statistical value to this stream. For convenient we provide the three play that reads this stream file and generates each statistical value as file.

2. LSP Setup information Configuration

This DML definition represents the LSP configuration information. Through this DML configuration several types of LSP setup information can be specified through the LSP_SETUP_INFO section. This section should be defined in “LPS_Creator” dummy host node. This special host plays a management system’s role in simulation environment.

Keyword	Description
host [graph [ProtocolSession[name ip use gov.nist.antd.ssf.os.IP]]	
ProtocolSession [name LSPCreator use gov.nist.antd.rsvp.te.LSP_Creator SignalingProtocol %S	LSP Creator module must define the signaling protocol that is used to setup LSP through the “SignlaingProtocol” attributes. Two signaling protocol can be defined, “RSVP” or “CRLDP”.
LSP_SETUP_INFO [LSP [ID %I	ID value must be specified. This will be used to identify each LSP in a signaling protocol and forwarding table.
PathID %S	PathID is string-valued parameter that is used to display the information of each LSP
TunnelLSPID %I	Specify the tunnel LSP ID if this LSP go through the tunnel LSP.
LSPType %S (Default : Normal)	LSPType defines a type of LSP. We support four type LSPs: “Normal”, “Backup”, “Optical”, and “Tunnel” LSP. Normal LSP means that it has no special characteristics.

	BackupLSP is used to switch over the defected LSP's traffic. OpticalLSP means that the LSP traverses optical network domain. Through TunnelLSP several LSPs can be established.
SetupTime %F ReleaseTime %F	These two fields specify the LSP setup and release time. It is recommended that the setup time must be set after 10 seconds. Because MPLS module must configure interface, scheduler and queue and so on. If the release time is not defined, LSP is maintained until end of simulation
Scheduler [Type %S Value %F]	This field specifies the scheduler for this LSP. Three types of scheduler can be possible to use. "Priority" and "WFQ". According to type, "Value" field may be defined.
FEC[Src [Grp [ID %S ID %S ...] Port [min %I max %I]] Dst [Grp [ID %S ID %S ...] Port [min %I max %I]] ToS %I ProtocolNum %I]	This field specifies the Forwarding Equivalent Class. This field is only specified in case of Normal LSP type. In previous version, only one FEC is mapped into the LSP. Namely, only one application connection uses the LSP. But, GLASS 1.1 version, we can configure several application connection (UDP, TCP) can use the one LSP. Grp section defines the source nodes ID. Several nodes can be specified. Port section define the port numbers
TrafficParameters [PDR %I(bits) PBS %I(bits) CDR %I(bits) CBS %I(bits) EBS %I(bits)]	Traffic Parameter defines the traffic requirement of LSP. This value is used to policy traffic in each LSR. Using these values, Each LSR create Traffic Policy module, dual leaky bucket, and apply each packet to test a conformance. PDR : Peak Data Rate PBS : Peak Bust Size CDR : Committed Data Rate CBS : Committed Burst Size EBS : Excess Burst Size.
TEPath [SrcID %I DstID %I Constraint [ConstraintType %I Value %I CompareType %I] ...] ERL [Route [ID %I LR %S(true/false)] ... Route [ID %I LR %S(true/false)]]	Each LSP can be established using the Explicit or implicit manner. In order to use explicit route, it must be defined ERL field that consists of Route parameters. Each Route fields define the Node with Node ID of each LSR and Loosened Routing flag. For implicit route decision, TEPath fields must be specified. It defines the source and destination node ID and Constraints. Do not define both at same time. Only one field must be defined in one LSP. It is possible to use several LSPs that have different route decisions.
BKLSP [InstantSetup %S(true/false) ProtectedPath [LSPID %I ...]]	This section must be defined when the "LSPType" is "Backup". If InstantSetup flag is set, Backup LSP immediately established at SetupTime. Otherwise, it is established when the protectedLSPs are damaged. "ProtectedPath" indicates the LSP that is protected by this LSP.
OpticLSP[SrcNodeID %S SrcIntfID %I DstNodeID %S	This field must be specified when the LSP type is Optical LSP. This section specifies the Optical Tunnel LSP's source /destination Node and Interface.

DstIntfID %I] RL %S(true/false)	
RR %S(true/false)	Record Route Option flag – ONLY RSVP-TE
ResvConfirm %S(true/false)	Reservation Confirm Flag – ONLY RSVP-TE
] ...]	

3. DiffServ Configuration